

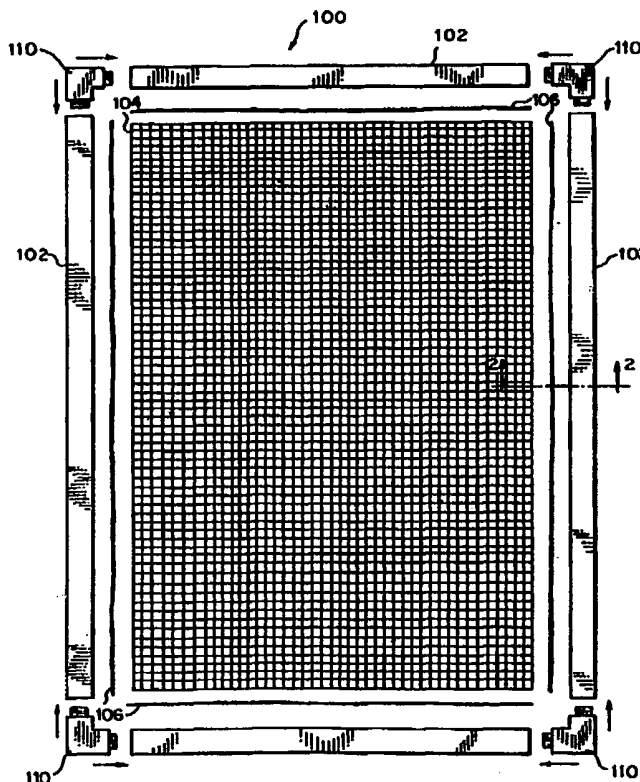


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(54) Title: WINDOW AND DOOR SCREEN ASSEMBLIES**(57) Abstract**

The invention provides screen assemblies (100) usable in connection with windows and doors and a method of constructing same. The assemblies (100) include frame members (102) with a channel (108) therein, screening (104) with a desirable configuration and properties situated in the open area within the connected frame members (102) and a material (106) in the channel securing the screening to the frame members (102). The method of constructing includes the steps of filling a portion of a channel (108) of the frame members (102) with a material (106) and positioning the edge of a desired screening (104) in the channel (108) with the material (106), thereby fixing the screening (104) in relation to the frame members (102).



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WINDOW AND DOOR SCREEN ASSEMBLIES

FIELD OF THE INVENTION

The present invention relates to framed screens used in window and door assemblies.

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BACKGROUND OF THE INVENTION

For many years, windows and doors assemblies have included framed screens that allow ventilation between the inside and outside of a structure. In locations where the winter is harsher, the opening where such framed screens are located are often closed by framed glass panes during colder periods. In such cases, a framed screen may be, for example, removed from the window or door and replaced by a framed glass pane. At other times, the framed screen may be moved within the window or door (e.g., raised from a lower to a higher position or moved from side to side) and the framed glass pane positioned in the opening.

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The construction of such framed screens have included, in many situations, a metallic four-sided frame with screening filling the enclosed area. The screening is fixed to the frame by the use of a flexible material, often a material with rubber or vinyl-like properties, such as a rubber gasket or spline, which holds the outer edge of the screening in a locked position inside of a groove in the frame. This construction allows the user of the frame to replace the screening by, for example, (1) removing the flexible material, (2) removing the existing screening, (3) positioning an appropriately sized piece of new screening to cover the enclosed area of the frame, and (4) forcing the flexible material against the edge of the screening and into the groove in the frame, thus locking the screening into position. This operation is often necessary when, for instance, the screening develops a hole or a tear in it.

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The use of such screening affixed in the groove of a frame by such flexible materials, however, has its deficiency. For instance, the screening, to be affixed to the frame in this manner, is typically of a type that is relatively easy to tear or otherwise puncture. Minimal forces asserted against the screening in the frame can result in the screening being pierced or detached from the lock created by the flexible material in the groove of the frame against the portion of the screening in that groove. The use of stronger, less flexible screening cannot solve this problem because, for instance, the screening would have to be specially manufactured with a concave outer perimeter configured to fit in the groove in the frame (i.e., less flexible, stronger screening would not be as easily affixed into the groove by forcing the flexible material).

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Stronger screening has been put to use in instances where security and safety are concerns. For example, prison often have strong screening over certain windows. These screen, however, are typically large, one piece units with structures that are permanently affixed to the structure of the building. The areas covered by such screens cannot be easily opened to, for example, place objects in or pass objects through the areas (e.g., these areas are not easily cleared for placement of an air-conditioning unit).

OBJECTS

It is thus an object of the present invention to provide window and door screen assemblies, usable in place of existing window or door screen, that are more resistant to tearing, puncturing and other damage caused by the application of relatively minimal forces against it.

It is also an object of the present invention to provide window and door screen assemblies that are relatively easy to install.

Another object of the present invention is to provide window and door screen assemblies that include frames, screening and other materials that are relatively inexpensive.

Still another object of the present invention is to provide a method of manufacturing window and door screen assemblies that is simple, while producing window and door screen assemblies meeting the objects set forth above.

The foregoing objects and advantages of the present invention are illustrative of those which can be achieved by the present invention and are not intended to be exhaustive or limiting of the possible advantages which can be realized. Thus, these and other objects and advantages of the invention will be apparent from the description herein or can be learned from practicing the invention, both as embodied herein or as modified in view of any variations which may be apparent to those in the art. Accordingly, the present invention resides in the novel parts, constructions, arrangements, combinations and improvements herein shown as described.

SUMMARY OF THE INVENTION

The present invention is directed to a screen assembly. The assembly includes at least one frame member configured to enclose an open area. The frame member includes a channel along a portion of its length. Screening with desirable configuration and properties is situated in the open area. The edge of the screening is positioned in a portion of the channel. A material occupying the channel with the edge of the screening secures the position of the screening in the

channel.

The present invention is also directed to a method of constructing a screen assembly. The method includes the step of filling a portion of a channel of a frame member of the screen assembly with a material. Thereafter, the edge of screening to be used in the assembly would be positioned in the channel with the material. The combination of the material and the edge of the screening fixes the position of the edge of the screening inside of the channel. After the screening is fixed in the first frame member, the screening can be fixed in other frame members, if any, by positioning the frame members with or without the material in their respective channels, if applicable, around the area occupied by the screening.

BRIEF DESCRIPTION OF THE DRAWINGS

There are seen in the drawings forms of the present invention which are preferred and which represent the best mode presently contemplated for carrying out the invention. It is understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown.

FIG. 1 is an exploded front view of one window assembly embodiment of the present invention.

FIG. 2 is a cross-sectional view along line 2-2 in FIG. 1, where the elements of the particular embodiment in FIG. 1 are connected.

FIG. 3 is a partial perspective end of a frame member in accordance with the present invention.

FIG. 4 is an exploded cross-sectional view of a prior art frame with screen and spline.

FIG. 5 is a partial perspective end view of a prior art screen assembly.

FIG. 6 is an exploded front view of one door assembly embodiment of the present invention.

FIG. 7 is an exploded front view of another window assembly embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows an exploded view of one particular embodiment of the present invention. The primary structural support for screen assembly 100 is the connected collection of frame members 102 (referred to herein individually as frame member 102). Frame members 102

surround screening 104 and are spatially fixed, in this particular example, in a rectangular form.

Screening 104 is fixed inside of frame members 102 by material 106. (FIG. 2 shows, in cross section, the interconnection of one of frame members 102, screening 104, and material 106.) In this particular embodiment, frame members 102 may be held together by corner inserts 110. The text below elaborates on the foregoing.

In the particular embodiments shown in FIGS. 1 and 2, frame members 102 are similar in construction and composition. Each frame member 102 is made of roll-formed aluminum. Depicted separately and in more detail in FIG. 3, frame member 102 has a height of "a" and a width of "b". The depth and width of channel 108 are "c" and "d", respectively. In the embodiment depicted in FIG. 3, "a", "b", "c" and "d" are one inch (1"), a quarter inch (1/4"), one-half inch (1/2"), and one sixteenth inch (1/16"). Some of several examples of component usable as frame members 102 include products similar to the glass molds manufactured by Mason Corporation with model numbers in the E200 series or similar molds manufactured by Superior Metal Products in the 200 series. One of ordinary skill in the art would realized the materials used for frame member 102, the process by which frame member 102 is formed, the geometric structure of frame member (e.g., frame member 102 could also include, for instance, a flange), and the dimensions of the characterizing features of frame members 102 (e.g., its height, its length, the width and depth of the channel) are variable. Frame member 102 could also include, as known by one skilled in the art, a weatherstrip.

In contrast to frame member 102, the conventional screen frame, such as frame 99 shown in FIGS. 4 and 5 (an illustration of the prior art screen frame), include, as a necessary feature, U-shaped space 112 to receive spline 114. Spline 114, or a similar element, is typical used to forceable hold screening 116 in place as seen in FIG. 5. Mason Corporation's C100 series of screen frames and similar frames manufactured by Superior Metal Products in the 100 series, are examples of frames that are configured and constructed similar to prior art frame 99.

Screening 104 is made of material with a desirable level of stiffness and inelasticity. The material used for screen assemblies taught by the prior art are made of fiberglass and aluminum wire. In the particular embodiment shown in FIGS. 1 and 2, screening 104 to be used in a residential setting could be, for example, constructed from carbon steel wire. More preferably, screening 104 for the residential setting would be electronically galvanized, painted black, and have gauge measurements between, for instance, 18 and 28. In setting where security is more of an issue (e.g., prison, banks, etc.), screening 104 could be, for example, constructed from

stainless steel wire. More preferably, such screening would also have gauge measurements in the range of 18 to 28. The use of carbon steel and stainless steel screening, as taught in the prior art, includes permanently fixing the screening to the building in one piece thus making access through the screened area difficult even when access is desirable for acceptable purposes. This art prior screen assembly is also relatively difficult, time-consuming and expensive to construct. The use of carbon steel and stainless steel in accordance with the present invention results in windows and doors that (1) are strong in construction and (2) are usable in place of existing assemblies, while (3) preserve all of the functionalities of existing assemblies (e.g., allow for access through openings at the discretion of the user as with conventional window and door screen assemblies.)

FIGS. 1 and 2 also show material 106, which may be of any number of compositions. The purpose of material 106 is to fix screening 104 inside of frame members 102 such that screening 104 does not move in relation to frame members 102 when relatively large forces are applied to either of these two elements. Material 106 must prevent the movement of the portion of screening 104 longitudinally within channel 108 and prevent that portion of screening 104 from being latitudinally removed from channel 108. In the preferred embodiment of the present invention, material 106 would be a silicon-based material that would bind the portion of screening 104 in channel 108 to the inside walls of channel 108 while the silicon-based material fills the space in channel 108 not occupied by screening 104. One of ordinary skill in the art would realize that the other composition could be used as material 106 and perform the same function. Such a skilled person would also know that the placement of screening 104 within channel 108 could be more secured by the use of, for example, pop rivets in selected locations on frame members 102.

One of ordinary skill in the art would realize that the type of components and other materials useable in connection frame members 102 are numerous. FIG. 1 shows corner inserts 110, which secure frame members 102 when the elements of screen assembly 100 are fully connected. By way of example, corner inserts 110 could be the kind distributed by Mason Corporation (e.g., corner inserts in the E70 series). It is also conceived that other components or materials could be used to perform the same function and that frame member 102 could alternatively be constructed to interconnect without the use of other components.

The present invention is not limited to windows. As seen in FIG. 6, door assembly 200 includes door frames members 202 and 204, screening 206 both above and below center bar 208,

corner inserts 210 and material 212. In this particular embodiment, frame members 202 and frame members 204 are "j" and "k" long respectively. Examples of elements that could functions as door frame members 202 and 204 both include, in appropriately sized, the framing in the D100 series of Mason Corporation (used as the main frame for sliding patio screen doors) or the 1150 series of framing used for patio screen door frames distributed by Superior Metal Products. Center bar 208 is "l" long with nobs 214 extending "m" from the ends. Center bar 208 could be, for example, similar in design and construction as the pushbar distributed by Superior Metal Products in the 2200 series or mullin in the D100 series distributed by Mason Corporation. Preferably, dimensions "j", "k", and "l" are measurements of the kind generally found in the design of typical doors of this kind, however, one skilled in the art could foresee the use of elements with different measurements.

The embodiment of the invention shown in FIG. 6 could be used as a after-market product that replaces screens on existing door. After an existing screen is removed from a door, door window screen assembly 200 may be, for example, spot riveted, screwed into or otherwise affixed to the main framing of the door. Other embodiments of the same invention may be integrated into the design and construction of doors as they are originally manufactured.

FIG. 7 shows an atypical embodiment of the present invention. Window assembly 300 includes semicircularly shaped frame members 302 and 304, screening 306, connectors 308, material 310, translucent material 312 and separators 314. In this particular embodiment, translucent material 312 is decorative and screening 306 is connected to frame members 302 and 304 only where translucent material 312 is not so connected to same. Separators 314 connect the edges of translucent material 312 to certain edges of screening 306. One skilled in the art would realize that other embodiments of the present invention could also vary in such aspects as, for example, the number, size, shape and other attributes of the frame members, the use of other elements or materials in the construction of the screen assemblies and the places and degrees of connectivity between the screening and one or more of the frame members. One of ordinary skill in the art would realize that components and materials other than those explicitly mentioned herein in connection with or as part of the present invention (e.g., splines, gaskets, clip and other components typically used in the design and construction or windows and/or doors) may be used in addition to or in place of the various elements of the present invention identified herein.

The present invention also includes a method of constructing a screen assembly. This method may be used, with known variations (e.g., additional steps), in the construction of screen

assemblies for windows or doors. One of ordinary skill in the art would also realize that the order of the steps may be variable based upon a number of factors and that additional steps could be added to the process as need to refine or otherwise complete the process for the production of a desired product. The process includes the application of a material to at least a portion of one of the frame members of the screen assembly. In the preferred method, the material is applied in channels in all of the frame members. After the application of the material, the edge of the applicable screening (*i.e.*, screening possessing a desirable configuration and properties) is positioned against the material. Preferably, and more specifically, the edge of the screening is positioned inside of channels in the frame member with the material therein and the material fixes the screening in place relative to the frame member. After the screening has been fixed with respect to one frame member, and in some cases simultaneous with such fixing, the screening is fixed in position relative to any remaining frame member(s). The preferred method also includes, at the beginning of, during or at the end of the process, the step of locking the frame members in position relative to each other.

The use of the elements and method of the present invention as disclosed herein provides several benefits not achieved by use of elements or processes of the prior art in a conventional manner. The use of method of the present invention results in a product that is stronger than conventional screen assemblies and less susceptible to breakage -- an adult leaning on the screen assembly of the present invention will not break it. The screen assemblies are also, however, weak enough to allow emergency personnel and others to break through as necessary in emergency situations with the use of an axe or similar instrumentality. By the use of frame members such as those used with glass panel assemblies in connection with the present invention, the method is simplified and relatively inexpensive. Moreover, the elements of the screen assembly (*e.g.*, the frame members which are also usable in connection with glass panel assemblies) could be off-the-self (preexisting) materials, in many cases, and thus readily available and relatively inexpensive -- the manufacturer of a screen assembly taught herein would not have to produce or purchase specially manufactured elements. Other materials and components from glass panel assemblies could also be used with screen assemblies in accordance with the present invention to enhance their construction and durability. In addition, since the screen assemblies constructed in accordance with the teachings herein may be the same size and configuration as existing screen assemblies, the screen assemblies of the present invention may be more readily used to replace the screen assemblies and glass panel assemblies taught in the prior art.

The above embodiments are merely illustrations of the apparatus claimed herein. The invention also includes other embodiments not specifically disclosed above, embodiments which one of ordinary skill in the art would realize and envision as equivalents or derivations of the embodiments shown as existing in other specific forms without departing from its spirit or essential attribution. Numerous variations may be made within the scope of this invention and without sacrificing its chief advantages. Thus, the terms and expressions have been used as terms of description and not terms of limitation. Instead, references should be made to the appended claims, rather than to the foregoing specification and drawings, as indicating the scope of the apparatus invention.

What is claimed:

1. In a screen assembly comprising:

at least one frame member configured to enclose an open area, wherein such frame member includes a channel along a portion of its length,

5 screening with desirable configuration and properties situated in the open area with the edge of the screening positioned in a portion of the channel, and

a material occupying the channel with the edge of the screening that secures the position of the screening in relation to the inside of the channel.

10 2. The screen assembly in Claim 1 wherein said assembly comprises four frame members.

3. The screen assembly in Claim 1 wherein the material is a silicon that binds the edge of the screening to a portion of the inner surface of the channel.

4. The screen assembly in Claim 2 wherein the each of the four frame members include a channel and the edge of the screening is positioned in the channels of each frame member.

15 5. The screen assembly in Claim 1 wherein the screening is made of carbon steel.

6. The screen assembly in Claim 5 wherein the screening is made of stainless steel.

7. The screen assembly in Claim 1 further comprising at least one center bar separating the open area into at least two segments.

8. The screen assembly in Claim 1 wherein the assembly is used as part of a door.

20 9. A method of constructing a screen assembly including the steps of:

applying a material to a portion of at least one frame member of the screen assembly;

positioning the edge of screening with a desirable configuration and properties against the material such that the position of the edge of the screening becomes fixed relative to the frame member; and

25 positioning the remaining portion of the frame member and any other applicable frame members around the area occupied by the screening.

10. The method in Claim 9 wherein the material is applied inside of a channel in the frame member.

30 11. The method in Claim 10 wherein multiple frame members have channels and the materials is applied inside substantially the entirety of the channels.

12. A method of constructing a screen assembly including the steps of:

positioning the frame members of the screen assembly, at least one of which includes a

channel, in a desired configuration such that there is an open area formed within the screen assembly;

positioning screening in the open area within the frame members with an edge of such screening positioned in the channels of the frame members; and

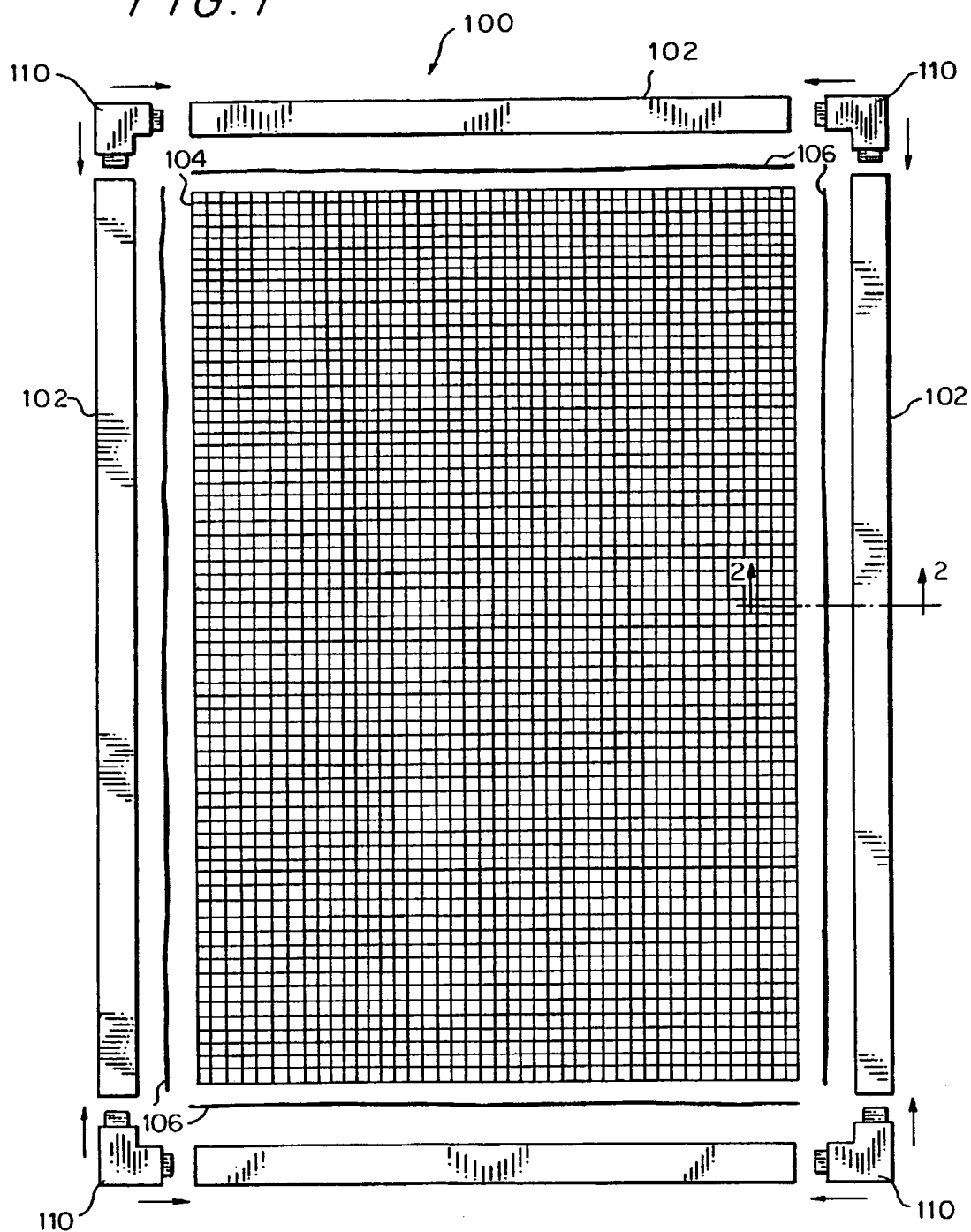
5 filling the channels occupied by the edge of the screening with a material such that the position of the edge of the screening relative to the inside of the channels is fixed.

13. The method in Claim 12 further comprising the step of locking the frame members in position.

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1 / 4

FIG. 1



2 / 4

FIG. 2

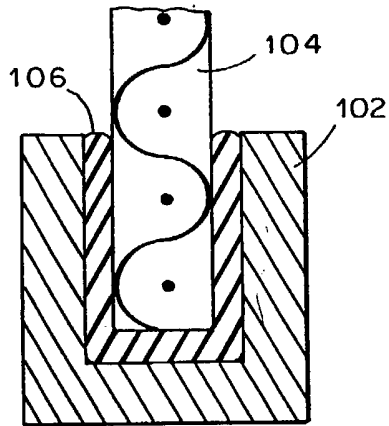


FIG. 3

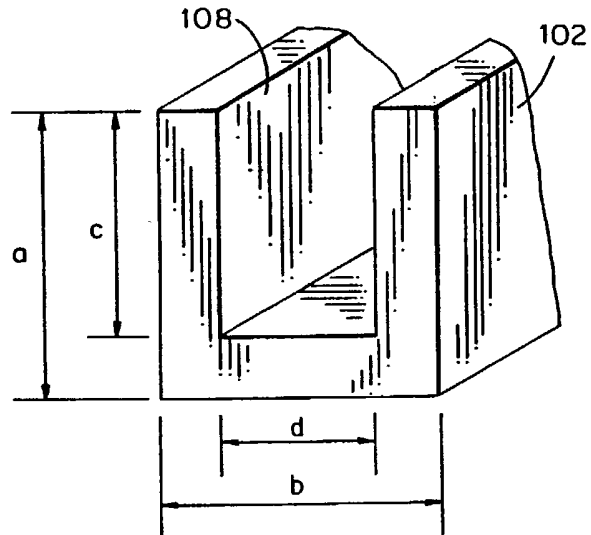


FIG. 4

(PRIOR ART)

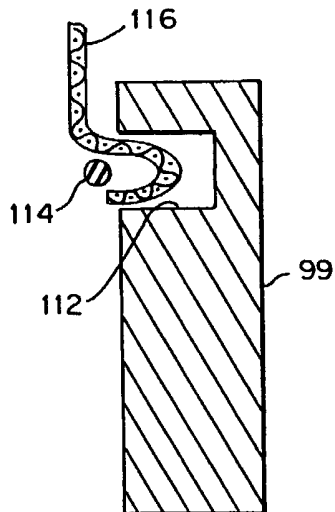
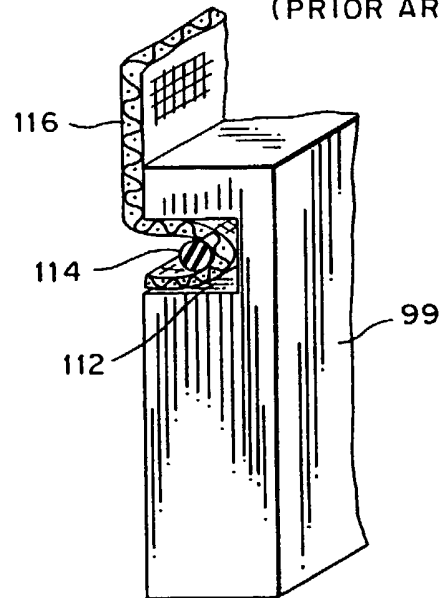


FIG. 5

(PRIOR ART)



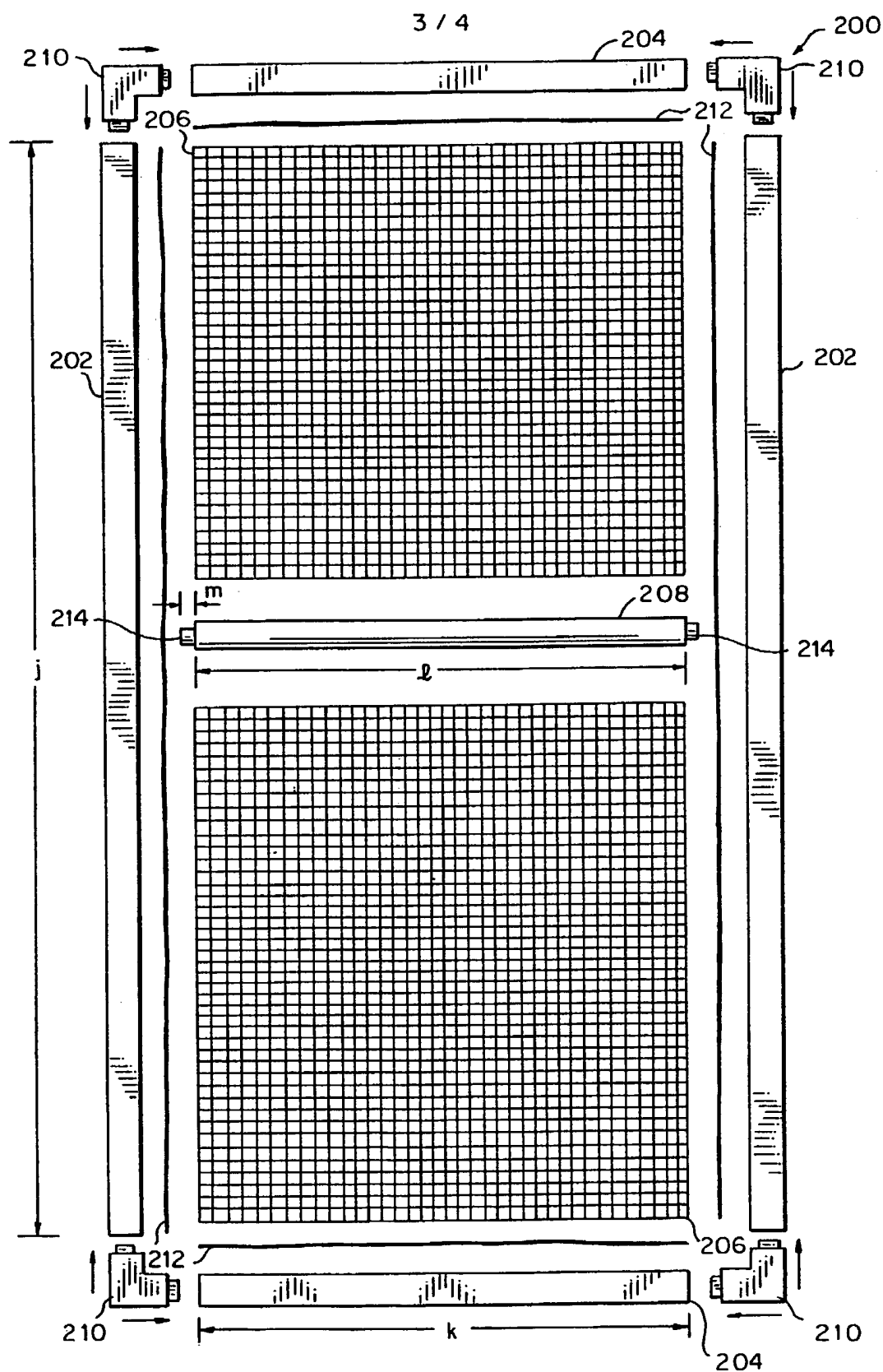
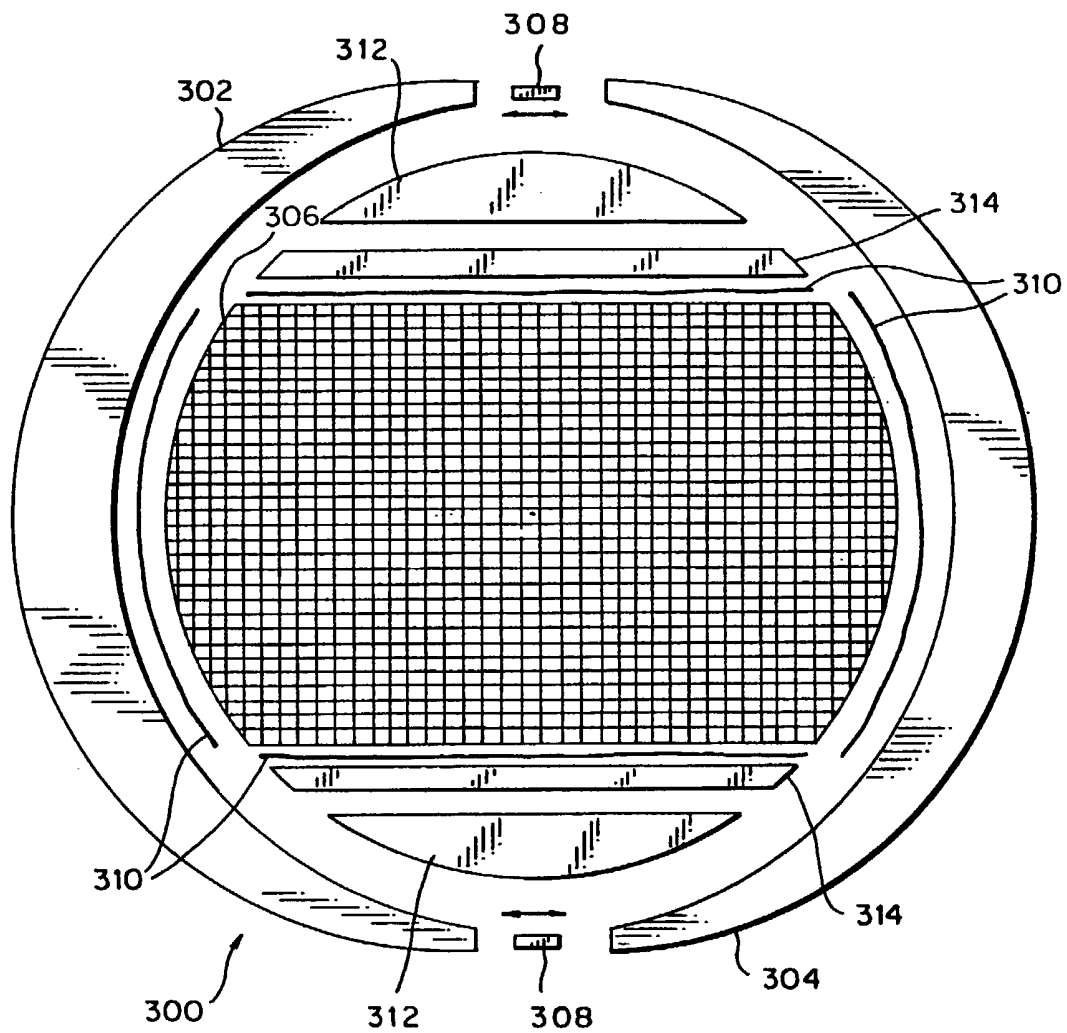


FIG. 6

4 / 4

FIG. 7



INTERNATIONAL SEARCH REPORT

 International application No.
 PCT/US98/18585

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : A47G 5/00

US CL : 160/371

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 160/371, 369, 379, 381, 384, 391, 395, 405

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,002,195 A (NAGASE) 11 January 1977 (11/01/77) See the entire document	1-13
X	US 3,255,810 A (ROWBOTTAM) 14 June 1966 (14/06/66) See the entire document	1-6, 8-13
X	US 2,762,430 A (SYLVAN) 11 September 1956 (11/09/56) See the entire document	1-13

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 ☐ See patent family annex.

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Date of the actual completion of the international search

03 DECEMBER 1998

Date of mailing of the international search report

26 JAN 1999

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